DOCUMENT RESUME

ED 360 484 CE 064 086

AUTHOR Arzy, Marsha R.
TITLE Analysis of Necessary Computer Skills for Entry-Level Office Workers.
PUB DATE Aug 92
NOTE 92p.; Master's Thesis, Eastern Montana College.
PUB TYPE Dissertations/Theses - Masters Theses (042) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Computer Literacy; *Educational Needs; *Employer Attitudes; *Employment Qualifications; *Entry Workers; Office Automation; *Office Occupations; Organization Size (Groups); Questionnaires; State Surveys
IDENTIFIERS *Wyoming

ABSTRACT

The level of computer training needed by students seeking entry-level office jobs was the subject of a questionnaire mailed to 153 businesses in northern Wyoming. Usable responses were received from 117 businesses (for a response rate of 76.5 percent). Company size did not significantly affect computer use. Even though 51 percent of the firms contacted have fewer than 5 employees, 94 percent of the respondents stated that computers are used at their businesses to perform office tasks. The vast majority of businesses reported using IBM and/or IBM-compatible computer systems, and 40 percent stated that their computers are connected to a local area network. Use of electronic mail was also found to be increasing rapidly. Seventy-eight percent of the respondents either preferred or required that entry-level workers be able to operate a word processor. Ninety-two percent of the respondents expressed a preference for applicants with previous work experience, and 60 percent indicated a preference for entry-level workers with at least some training beyond high school. (The survey questionnaire and survey-related correspondence are appended.) Contains 40 references. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 360 484

ANALYSIS OF NECESSARY COMPUTER SKILLS FOR ENTRY-LEVEL OFFICE WORKERS

A Thesis
Presented to the Graduate Faculty
of Eastern Montana College
in Partial Fulfillment of Requirements
of the Degree of

MASTER OF EDUCATION

Option: EDUCATIONAL COMPUTING

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☒ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

M. R. Arzy

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Marsha R. Arzy
August 1992

CE 064 086

BEST COPY AVAILABLE

EASTERN MONTANA COLLEGE

As members of the Examining Committee of Marsha R. Arzy we certify that we have read the Thesis entitled **Analysis of Necessary Computer Skills for Entry-Level Office Workers**, and have participated in an examiniation of the candidate. It is our recommendation that the paper be accepted as fulfilling the Thesis requirement for the degree of Master of Education, Educational Computing Option.

Chairperson of the Examining Committee: Date

_____ _____

Members of the Examining Committee: Date

_____ _____

_____ _____

Dean of Education and Human Services: Date

_____ _____

ACKNOWLEDGEMENTS

My sincere gratitude to Dr. David Davison, my advisor, for his wise counsel, his support throughout my coursework, and his encouragement during the writing of this thesis. His assistance and wisdom were invaluable.

I also extend my appreciation to Dr. Lowell Barr of the University of Wyoming and Mr. Paul Millhouse of Sheridan College for their advice and continued support. Special thanks to my friends and colleagues for their interest and encouragement in this project. Without their prodding and positive reassurance this project may not have been accomplished. Particular thanks to the support staff of Sheridan College for their efficient assistance and effective suggestions.

Special thanks to Joe, Bree, and Shelta for allowing my dream to come true. Their patience, love, and support are witnessed throughout this project.

ABSTRACT

This study was designed to investigate the level of computer training necessary for students seeking entry-level office jobs. The purpose was to obtain current information pertaining to the computerization of offices in Wyoming.

A mail survey was conducted using 153 businesses in northern Wyoming. One hundred seventeen businesses responded for a return rate of 76.5%. Participant data indicate that 94% of the businesses use computers to perform office tasks. Computer hardware used by the businesses was overwhelmingly IBM and/or IBM compatible systems. The use of local area networks is increasing rapidly as is utilization of electronic mail. The majority of businesses utilize modems.

Offices are generally small with 51% having less than five office employees. The majority do not give any kind of employment test to applicants. They do, however, expect entry-level workers to have typing and word processing skills. Most businesses prefer education of some type beyond high school and 92% prefer applicants with previous work experience. Respondents stated that computer experience entered into hiring decisions for persons seeking entry-level office jobs.

Familiarity with computers, exposure to technology, and understanding the terminology, will play an important role in successful job entry.

CONTENTS

CHAPTER		PAGE
I.	INTRODUCTION	1
	Overview	1
	Statement of the Problem	3
	Rational for the Study	4
	Research Question	5
	Delimitations of the Study	5
	Definition of Terms	5
	Summary	7
II.	REVIEW OF RELEVANT LITERATURE	8
	Framework of Office Tasks	9
	Workforce Profile & Computer Technology	12
	Employer Expectations	15
	Where to Begin	15
	How Much to Know	17
	Employment Training	17
	Other Research	18
	Summary	24
III.	DESIGN AND METHODS	26
	Design of the Mail Survey	26
	Data Collection	27
	Subjects of the Survey	28
	Data Analysis	29

IV. RESULTS AND DISCUSSION 31
Survey Results 31
Preliminary Information 32
Survey Question 1 33
Survey Question 3 34
Survey Question 4 35
Survey Question 5 36
Survey Question 6 37
Survey Question 9 38
Survey Question 10 39
Survey Question 11 40
Survey Question 12 41
Survey Question 13 41
Survey Question 14 42
Survey Question 15 43
Survey Question 16 44
Survey Question 17 45
Survey Question 18 46
Survey Question 19 46
Survey Question 20 47
Questions 21, 23, 25, 27, 29, 31 48
Questions 22, 24, 26, 28, 30, 32 49
Summary 50

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 53

Summary 53

Importance of the Study 53

Conclusions & Recommendations 54

Recommendations for Further Study 59

Concluding Remarks 60

APPENDICES

A. Survey Instrument 64

B. Letter of Introduction 69
Definition, Entry-Level Employee 70

C. Follow-up Letter 72

D. Data Analysis not in Chapter IV 74

REFERENCES 78

TABLES

TABLE		PAGE
1.	Number of Office Employees	32
2.	Number Responding by Category	33
3.	Office Tasks, Typewriter vs Computer	34
4.	Businesses Using Computers	35
5.	Number of Computers Used Per Office	36
6.	Computer Hardware by Type	37
7.	Length of Time Equipment in Use	38
8.	Networks and Electronic Mail	39
9.	Use of Modem with Office Computer	40
10.	Employer's Use of Job-Entry Testing	40
11.	Typing Skill Required	42
12.	Education/Training Necessary Beyond High School	43
13.	Categories of Education/Training	44
14.	Employer Preference for Work Experience	45
15.	Computer Experience Enters in Hiring Decisions	45
16.	Adequate Number of Applicants	46
17.	Applicants Qualified for Entry-Level Position	47
18.	Employer Attitude Toward Word Processing	48
19.	Respondent's Opinion on Designated Applications	49
20.	Total Number of All Employees	75
21.	Classification of Typewriters	76
22.	Other Equipment Prior to Current System	77
23.	Planning to Add Over Next Two Years	77

FIGURES

FIGURE PAGE

1. Percentage of Computer Use 50

CHAPTER I

INTRODUCTION

Overview

Over the last several decades our society has evolved into one which demands more white collar jobs than the blue collar production jobs of the 1950's and 1960's. Today there is a need for employees to handle the large amount of "paper" data that is produced on a daily basis. Our society has become one which requires an amazingly large amount of information to keep our businesses moving forward. Lloyd Bartholome (1991) noted in a recent article in the Business Education Forum that "this is an era in which knowledge has overtaken steel, oil, and wheat as a source and measure of wealth and strength" (p. 16).

Thus we see the demand for more skilled office workers to handle this multitude of data with the most efficient methods possible. The office worker of today must know more and be better prepared to begin his/her duties with less time spent in on-the-job training than was allowed in past years. According to Lankard (1990) the jobs for which employers are hiring today require workers to have a broader range of competencies than ever before--competencies that are job specific. The desire by employers for skilled workers is reiterated in the Scans Report for America 2000 (U.S. Dept. of Labor, 1991). The report focuses on what the work world requires of schools. It states that "employers

say they want people comfortable with technology" (p. 11).

This technology, the equipment used in the current office setting, enhances the efficiency of the employee if he/she has knowledge of the operation of the equipment. Gattiker's (1989) research indicates that computer technology will soon be one of the largest capital asset items for many organizations. He concludes that "if the company is to reap the benefits of its huge financial investment, the workforce must possess the necessary skills to make efficient use of the new computer-based technology" (p. 4).

With this information in mind it is appropriate to consider the office skills that are needed by employees entering the job market. Questions relevant to this topic are:

1. Do businesses in northern Wyoming want employees with basic skills beyond reading and writing?
2. Do these businesses base hiring decisions on an applicant's formal computer training?
3. How pervasive is the computerized office in northern Wyoming?

The following study will explore these questions and examine what specific knowledge businesses desire in the area of computer software.

Statement of the Problem

The purpose of this study is to obtain current information pertaining to the computerization of offices in northern Wyoming. It is a difficult task for educators to assess what skills are most necessary for students to successfully enter office occupations. The study is also designed to examine the effects of computer training on successful employment in entry-level office jobs. This information is intended for educators. It should be used as a basis for curriculum decisions. In addition the information should be helpful to community colleges in northern Wyoming for future curriculum planning. The study examines the following questions:

1. Is typing an essential skill for an entry-level office worker?
2. What amount of word processing training, if any, is essential to an entry-level office worker?
3. What computer equipment and related systems are being used by entry-level office workers?
4. What software programs are entry-level office workers expected to know?
5. What degree of formal education/training is essential to entry-level office workers?
6. Do employers expect prior work experience or office practicum training before hiring an entry-level office worker?

7. Do employers of entry-level workers find an overabundance of qualified persons when hiring a new employee?

Rationale for the Study

Business educators strive to offer current training on up-to-date topics using state-of-the-art equipment. Through a survey of northern Wyoming businesses in Buffalo, Cody, Gillette, Newcastle, Powell, Sheridan, Thermopolis, and Worland, information was gathered regarding what level of training is expected in the office occupation area.

Computer equipment has become prevalent nationally in business offices. Business educators must deal with the dilemma of how much instruction to offer on the typewriter as opposed to the computer.

There are frequent changes in computer software. Educators often must speculate as to whether the office employer desires employees with training on a specific software or if the employer is willing to hire an applicant who has general knowledge in any type of software.

As a result of these technological advances in the area of office efficiency educators must attempt to stay apprised of hardware and software preferences. The data gathered in this study will aid educators and community colleges in northern Wyoming in developing new classes and updating current course offerings.

Research Question

What effect does an applicant's level of computer training have on successful employment for entry-level office jobs in northern Wyoming?

Delimitations

Delimitations of this study are:

1. Some companies do not have written "skills policies", therefore, responses may be based on the perception of the supervisor or personnel manager.
2. Generalizing the findings of the study may be limited to the population of northern Wyoming.

Definition of Terms

Computer Training: Formal education or private training to a level of competency that will allow the prospective employee to operate a microcomputer. A full operational knowledge of word processing software, and a familiarity with spreadsheet and database software.

Database Management: Software designed to simplify data collection tasks and to replace the traditional file cabinet as a means of storing and retrieving information (Wright, 1988).

Electronic Typewriter: A typewriter that has memory capability. Some may have limited window viewing or full screen viewing (Minicucci, from Pilch, 1989).

Entry-Level Office Worker: Job duties may include any or all of the following: filing, phone responsibilities,

minimal bookkeeping, correspondence, arranging meeting schedules, making travel arrangements, and record keeping.

Local Area Network (LAN): A group of interconnected personal computers within one building or a small area. The purpose of local area networks or LAN's is to facilitate software and data sharing (Trainor, from Rogers, 1990).

Office Automation: Computers used to increase office efficiency by networking with other office equipment to replace manual business procedures. Office automation encompasses word processing, electronic mail and electronic filing (Trainor & Krasnewich, 1987).

Spreadsheet: Software designed for tasks previously done with pencil, paper and calculator. When one variable is changed, all related computations instantly update. Users save documents on a work diskette or other form of electronic storage (Wright, 1988).

Supervisor/Personnel Manager: Person responsible for job interviews and largely accountable for hiring decisions regarding entry-level office workers.

Word Processing: The use of software designed for writing correspondence and reports. Users save documents on a work diskette or other form of electronic storage (Wright, 1988).

Summary

This study will provide information regarding the number of businesses in northern Wyoming that are using computers to assist in office tasks and will look specifically at what those tasks are.

Second, the study will determine to what extent computer training will be needed by office employees in the 1990's. This information will be useful to community colleges in the geographic region to assist in curriculum decisions and better prepare instructors to teach the more valuable skills.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

This study was designed to investigate the level of computer training that should be offered by business instructors to college students hoping to obtain entry-level office jobs. The study also attempted to ascertain the extent to which business offices in northern Wyoming are computerized. Earlier studies in southern and central Wyoming stimulated interest on the part of the researcher. The researcher wanted to determine if the trends from the urban areas of the state would hold true for the more rural counties. Wright's (1988) study of a large central Wyoming county looked at the brand of specific software being used and attempted to ascertain if the size of the company had an effect on the type of software purchased. She found that for word processing the most widely used software was WordPerfect, while the most widely used spreadsheet software was Lotus Development Corporations's Lotus 123. Her findings indicated no significant difference between large companies (more than 10 employees) and small companies in their selection of a brand of software for purchase.

Pilch (1989) investigated the knowledge and skills needed by entry-level clerical employees in Laramie, a southern Wyoming city. This particular city is the home of the only four year university in the state. Her study was concerned with typing and shorthand skills along with basic

skills competencies. Her findings indicated that entry-level clerical persons should be prepared to competently type at a minimal level of 50 words per minute. Her research showed evidence that IBM was the most widely used office equipment with regard to microcomputers. And, as in the Wright study, Pilch also found that WordPerfect was the preferred software of the businesses surveyed.

An additional study by Rogers (1990) surveyed the use of microcomputers in a southern county in Wyoming that is home to Cheyenne the state capital. She discovered that 71% of the respondents used microcomputers in their offices. The most common use of the computer was for word processing with WordPerfect used by 42% of the businesses using word processing software. She found that companies train existing employees through in-house training and through the community college.

This chapter will look at the framework of office tasks that benefit from computer technology. It will also examine the workforce and the skills companies are looking for in entry-level employees.

Framework of Office Tasks

In many offices the tasks to be accomplished are centered around data production, processing and dissemination. Offices today use automated equipment and software programs to increase their efficiency when dealing with various office tasks. Software programs are written

and used in the areas of word processing, spreadsheet applications, data base management, desktop publishing and accounting.

One of the more common functions of an office is word processing. Word processing is a means to electronically produce a document that can be easily changed, printed and stored. Through the use of a microcomputer and any of a host of software programs an automated office can expect a gain in productivity (Trainor & Krasnewich, 1987). Yet another task for office workers is the maintenance of numerical records through calculations. Many offices are employing electronic spreadsheet programs to assist with this time-consuming assignment. This popular software application was the number one application program being purchased in the United States in 1990 (Povick, 1990).

Another necessary task in today's office is the management of individual records. These records can be handled by a software data base management system, which resembles an electronic filing cabinet. The information that would normally be stored in a file folder is stored on magnetic media using a software program.

Additionally, in some offices it is necessary to produce publications that incorporate text and drawings. This can be accomplished with a system known as desktop publishing. Special software is used to convert text prepared by word processing programs into typeset fonts.

Drawings can then be prepared and incorporated into pages which have been laid out on the screen (Trainor & Krasnewich, 1987). At this time, however, desktop publishing has not seen such extensive use in the typical office setting as have the above mentioned programs.

Two new types of software have recently made their debuts in the modern office. The first is a computerized accounting program designed to keep an electronic ledger. This task can be accomplished using a spreadsheet program but requires the user to build his/her own ledger system. The convenience of transfer of the accounting concept has spurred interest in accounting software.

The second new form of software deals with communication both within the organization and outside. By electronically linking computers in a building or in close proximity, a local area network (LAN) is built that allows data sharing. Employees share access to computing power, data, and a wide variety of equipment, saving the company money and space. Computer links among employees also give them another channel for communication (Bovee & Thill, 1989). Once this network has been established employees communicate through a software program called electronic mail.

Software and hardware also allow for communication over long distances. This is made possible by modems attached to users' personal computers or attached to a network. A modem

connects to the standard telephone line to transmit digital data produced by a computer. A sending modem modulates digital data into analog form for transmission over standard phone lines, the receiving end demodulates the analog signal back into digital form (Trainor & Krasnewich, 1987).

These above mentioned software programs are becoming more prevalent in the office of the 90's. It is vital, then, that this study investigate the workforce which uses these efficient and effective tools.

Workforce Profile and Computer Technology

An article in the February issue of The Office touted the headline "Magnetic Media Changed our World in 11 Years" (Endrijonas, 1992). The world has indeed changed. In a decade's time, an entirely new vocabulary entered the scene, permeating not only the business arena but the manufacturing floors and the offices of management as well.

In the early 1980's a general consensus among office employees was that the automation of the office and the rapid advancement of technology would reduce the number of jobs available. Werneke (1983) deemed that microelectronically-based equipment was generally labor-saving. This led to assumptions about the labor displacement effects of microelectronics. This has not been the case. On the contrary, since that time the business world has seen an increase in office occupations. And as Baldry (1988) points out computer technology is all

pervasive not confined by physical location. It is a common feature of virtually all social activity.

Indeed, there has been an enormous increase in computer sales in a brief eight year period. Goldstein and Fraser (1985) noted that in 1984 over two million machines were sold. Compare this figure to Bartholome's (1991) estimates of 10 million purchased in 1989 and 11.5 million personal computers purchased in 1990. Wentling (1992) projects that computer technology will proliferate, and by 1995, 95 percent of what we want to know will be stored in a computer. How will these trends affect the office occupations market?

Jobs for entry-level office workers will still be available. One factor that will contribute to the growth in jobs will be the actual size of the available workforce. Due to slow population growth, the work force will expand by only one percent annually during the 1990's (Haynes, 1992). Looking at Goldstein and Fraser's (1985) research we see that the combined total of high school and college graduates in 1984 numbered approximately one million students. Compare this statistic with their estimate that in 1984 two million computers were purchased for business use. Owens, Lindner, and Cohen (1988) report that the fastest growing segment of the population is age 58 and older. What can this mean to the worker hoping to successfully obtain an entry-level office job? It is quite possible that as the

available pool of entry-level workers decreases, businesses will have to begin hiring employees who, less than five years ago, they may not have even considered for a job interview (Owens, Lindner, & Cohen, 1988). Another factor that may contribute to the availability of entry-level jobs is the practice by employers, hoping to reduce operating costs, of eliminating middle-management personnel and having essential functions performed "at the bottom of the ladder" (Short, 1991, p. 14).

In Wyoming there is a trend towards job growth in the service sector. According to the Wyoming Department of Employment (1991), "services" was the second largest employment division and showed the largest 1989-90 employment increase of 1,974 jobs (an increase of 5.8 percent). According to the State of Wyoming division of Research and Planning, the service sector is composed of businesses where "no physical product is manufactured" (Rhodes, 1992). On a national level, according to the SCANS Report for America 2000, services and retail trade comprise 44% of the job opportunities in the United States (U.S. Dept. of Labor, 1991). Wiggs (1992) writes that "prosperity in the United States will depend more on increases in worker output in the service areas than on gains in the manufacturing industries" (p. 20). Therefore, it is generally acknowledged that entry-level office work will be obtainable in the 90's.

Employer Expectations

Determining the exact skills employers are looking for in entry-level employees has been a perplexing issue for the past decade. Reports from employers often range from the minimal to the sublime. In 1989 Natriello's studies suggested that employers look for applicants with positive attitudes, while the December 1988 issue of USA Today just one year earlier than Natriello's study reported that "the ability to use computers to perform everyday tasks will be the most important job skill for the 1990s" (Wentling, 1992). Institutions offering instruction and training to entry-level employees hear an abundance of differing opinions. Some say employees need specific skills (Lankard, 1990). This view is supported by employers who want skills targeted to meet definite needs (McMeen, 1986). Conversely, others demand that teaching the prospective employee how to stay employed is enough to know.

With this in mind it seems vital to analyze where the job seeker should begin, how much he/she should know, and who can provide this training.

Where to Begin

Individuals hoping to enter the workforce still must prepare themselves with the basic language skills of reading, writing, listening and speaking, and too must practice time management techniques of punctuality, and reliability (U. S. Dept. of Labor, 1991). It has also

become increasingly important for workers in all areas to possess the ability to type at a competent level. Toppe (1991) recommends that keyboarding is an essential enabling skill for all students and workers. He goes on to suggest that future employees, regardless of their potential level in the hierarchy of companies, must gain proficiency in keyboarding. The successful mastery of this skill generally leads an individual to pursue more comprehensive computer skills. Indeed, Daniel (1988) writes that the fact that others in a department have well-developed computer skills does not eliminate the need for the manager as well to become computer competent. And managers in one research project stated that too many personnel, across all departments, were productively handicapped by the use of one or two fingers to operate the computer (Nellermore, 1992).

As noted in John Naisbitt's 1984 book *Megatrends*, "without basic skills, computer illiteracy is a foregone conclusion" (p. 33). Justifiably, employers want basic skills and keyboarding skills. But, when hopeful job candidates begin their job search they find that employers increasingly want more than their job announcements imply. Unfortunately, each year prospective entry-level employees find that the entry level is raised a bit higher due to exposure to an increasingly computer literate society (Garrett & Lundgren, 1992). An attempt can be made to bridge the gap between what prospective employees should

know and how these skill expectations are communicated by employers.

How Much to Know

Just how much a potential entry-level office employee should know is difficult to grasp through all the differing opinions. If it is assumed that employers want some type of computer exposure then one must look at what those skills might be. Stevens and Ferre's (1992) research of 2,500 businesses showed that word processing was the number one office activity. There is also some support for data base management training (Daniel, 1988) but this notion has not grown with the intensity of demand as has that for word processing capabilities.

Due to increased automation and the pervasiveness of word processing programs, workers are now expected to operate independently (Lankard, 1990). In fact, stable work experience (Natriello, 1989) combined with technical skills is a prized combination for entry-level job seekers as well as employers.

Employment Training

As the skills demanded to successfully gain entry-level employment have grown, the burden of training has been diffused and spread among employers and educators alike. Stevens and Ferre (1992) found that within small companies, nearly half provided no further training for employees. Because many companies cannot or will not provide training,

there has become a willingness on the part of both business and education to form partnerships in the hope of better preparing students for jobs (Zahn & Poole, 1992). This partnership commonly takes the shape of a business person providing a guest lecture or a business providing guided tours for students. It also means that businesses can contribute valuable current information and form advisory boards. The business side of the partnership may also lend its support as a location for student work experience. Many programs like these are helping bridge the gap between employer and employee expectations.

On the other hand companies with little time and limited resources often prefer to send current staff members to non-profit universities and colleges for computer training (Gattiker, 1989). Many companies now offer tuition reimbursement to employees taking college courses considered to enhance the employees' job performance (Owens, Lindner, & Cohen, 1988).

Other Research

In 1985 Richard Erickson of the University of Missouri and Yves Asselin of the University of Quebec conducted a study in the province of Quebec investigating the competencies needed by office workers and how office workers would be expected to interact with micro-electronic technology. The purpose of this research was to identify and prioritize the competencies that would be required of

clerical personnel who would be working in automated offices of the future (Erickson & Asselin, 1986). A panel of 48 persons from business, education, and clerical fields ranked and categorized the most necessary skills. The outcome suggests that emphasis should be placed on certain areas of curricula for persons hoping to obtain entry-level office jobs. In addition to exhibiting ability to prepare reports, determine appropriate form and style, and edit documents the report suggests that entry-level persons should display leadership, and demonstrate initiative and creativity. The report continues with advice that curricula give attention to the importance of exhibiting a positive attitude toward people, work, and **new technology**. The competency rating showed that emphasis on accepting challenges presented by new office technology and procedures will be necessary.

Erickson and Asselin (1986) found that in the cluster of competencies designated in their research, office workers must be able to operate word and data processing equipment, use microcomputers in regular office settings and select the appropriate tools to optimize output. They concluded their list of high priority, high consensus competencies by stating that office personnel should "understand the concepts and terminology pertaining to word processing and electronic mail" (p. 326).

A similar project in 1985 was conducted by Goldstein and Fraser surveying 196 employers to identify occupations

that involved computers. Approximately 140 occupations were identified in which some workers used computers. Their research showed that about one worker in eight used a computer (Goldstein & Fraser, 1985). This study was enlightening with regard to the rapid growth of computer use in the United States. The researchers estimated that as of "1982 computers have created 1.2 million new jobs in entirely computer-related occupations of programmers, system analysts, computer operating personnel, and repair technicians" (p. 11).

This study does not suggest that extensive computer-related training is needed by all workers. It does, however, show that students should have computer learning opportunities and become computer acquainted. Goldstein and Fraser (1985) suggest that entry-level employees must have a broad understanding of computers. This research indicates that much training in the recent past has been on-the-job due to rapid growth and the need to train existing personnel. As the emphasis shifts to training new workers the researchers see a greater role for schools. They believe computer training should be incorporated into aspects in the current curriculum for all students but in particular for office workers.

A study in 1986 by Barr and Zancanella of the University of Wyoming examined "the knowledges business demands of new office employees who have completed their

secondary education and are entering the world of work" (p. 4). Barr and Zancanella served as the principal investigators and worked with a committee of 40 educators throughout the state of Wyoming. Ninety-five businesses participated in the study with an individual from management as well as labor responding to the interview questions. The committee of interviewers found that most office workers in Wyoming held jobs which crossed lines of office duties and required more varied tasks be performed than did workers in less rural states. They found that office worker's tasks ranged from specific assignments to general duties. The findings of the study indicated a preference for entry-level employees with good human relations and time management skills. The respondents rated keyboarding skills as more important than ever before. When questioned about electronic mail, a number of respondents rated this as unnecessary. Barr and Zancanella suggest that schools (at that time) may have been a bit ahead of businesses in the use of electronic mail. Final recommendations of the study showed continued emphasis for educators on word processing training, and an increased effort be placed on accounting skills. Finally, the report states that students should develop skills that will prepare them for clusters of occupations rather than specific jobs.

A different question was studied in the United States in 1987. A joint effort of the Northwest Regional

Educational Laboratory and the Northwest Policy Center conducted a series of personal interviews with 58 human resource directors from various companies in Alaska, Guam, Hawaii, Idaho, Oregon, and Washington (Owens, Lindner, & Cohen, 1988). This research investigated the quality of entry-level workers. Like the Goldstein and Fraser research this study determined that workers must have adequate reading, writing, mathematics and communication skills. This research from Owens, Lindner, and Cohen, however, suggested that the present workforce is not work-ready with basic skills and even less prepared to take on the new skills of technology and compete in the world market-place (p. 4). The changing characteristics in the composition of the workforce have contributed to this problem. According to the researchers, the U.S. workforce is aging and will include proportionately more limited English speakers, more workers with young and elderly dependents, and more educationally disadvantaged persons. It is the opinion of the authors that for some time education, training, and workplace practices were regarded as "someone else's problem; basic skills and training were the schools' problem, . . . workplace policies were business' problem" (p. 5). The researchers focused this study on companies that are using innovative ideas to combine forces in the desire to overcome these skill deficits. Due to the shrinking size of the current labor pool capable of filling

the available entry-level office jobs there has become concern on the part of businesses about the quality of the workforce. This has led some businesses to form partnerships with education. This research indicates that employers need people with good technical skills . . . and the ability to transfer knowledge quickly (p. 55). The technical skills they believe are in shortage are those of experience with microcomputers and the ability to use a word processor. This study pointed out the many joint ventures of business and education. The researchers believe this will lead to improved student preparation for the work environment.

In another recent project, conducted by the U. S. Department of Labor (1991), the level of skills required to enter employment was examined. The twelve-month-long study was conducted by means of interview with business owners, public employers, managers, union officials, and workers. The researchers estimated that more than half our young people leave school without the knowledge or foundation required to find and hold a good job (p. xv). One obstacle to school success with respect to work was that employers had never clearly told educators what students needed to know to succeed (p. ix). The Secretary's Commission was looking at not only what work requires of schools but also looked to propose acceptable levels of proficiency to educational institutions. Thus, they identified five

competencies for effective job performance. These compentencies were seen as essential preparation for all students.

Identified as one of the five compentencies was "acquiring and using information" (U.S. Dept. of Labor, 1991, p. 12). The researchers believed that the use of computers to process information was crucial to this competency. Another compentency, "working with a variety of technologies" (p. 12), was seen as integral to problem solving and the overall ability to choose appropriate and efficient tools for a task. All the compentencies and the emphasis of the recommendations by the research group were that schools must do a better job in conveying to students the association between school work and real work. Through the interviews conducted by the research panelists, a report was made to President George Bush whereupon he proposed to Congress "New American Schools" (p. 20) where proficiency would be assessed through formal nationally-comparable assessments made in the 4th, 8th and 12th grades. Clearly, the group regarded computer training as a required enhancement for all occupations.

Summary

Research indicates that businesses are becoming more computerized each year. The price of computer equipment can be offset by improved productivity. All indications are that prospective entry-level office applicants should have a

basic understanding of typing/keyboarding, familiarity with the operation of a computer, and the ability to work independently. Research from 1986 (Burton, Filer, Fraser, & Marshall) suggests that even lower skill, lower paying occupations will demand a greater level of technological literacy. Indeed we have seen in a six year period an increased necessity for computer literacy in entry-level office occupations.

The long term effects of the computer as a tool for entry-level office employees cannot be projected with certainty. Research indicates a growing need for training. To continue meeting the needs of the northern Wyoming community it is necessary that the business community be surveyed periodically to determine the level of computer literacy needed by these businesses.

CHAPTER III

DESIGN AND METHODS

This study was designed to determine the extent to which businesses in northern Wyoming have computerized their operations. Also, it was the intent of the researcher to learn which computer skills are most necessary for entry-level applicants to successfully gain employment. This chapter will explain the design of the survey, how the survey was conducted, the subjects of the survey, and how the results were analyzed.

Design of the Mail Survey

The researcher disbursed a mail survey as the chosen method of data collection. A mail survey was selected due to the large geographic area of northern Wyoming. Ary, Jacobs, and Razavieh (1985) believe that because a questionnaire is designed for self-administration it is possible to include a larger number of subjects in more diverse locations than is practical with an interview. Another advantage of using a mail survey rather than a telephone interview is to lessen the likelihood of surveyor bias and avoid the temptation to lead the participant (Orlich, 1978).

It was imperative in this survey that the person who makes the decisions on hiring entry-level office employees receive the actual survey instrument. For this reason the

envelope was addressed to the owner or manager as listed in Chamber of Commerce records.

The survey instrument was two pages in length with questions on both the front and back of the pages. There were 32 research questions. The anticipated length of time to complete the survey was 10 minutes.

The initial instrument was reviewed by professional educators in the field of business education. A pilot test was made using two Sheridan businesses. One question was difficult to interpret consequently it was rephrased into two sentences. Following this adjustment the survey was prepared in final form.

Data Collection

On April 30, 1992 a survey (Appendix A) was mailed to selected businesses in northern Wyoming. The majority of survey questions utilized the closed form whereby the respondent would circle his/her answer. A letter of introduction (Appendix B) accompanied the survey. And a self-addressed stamped return envelope was also enclosed as recommended by Hillway (1964) to obtain a reliable response rate. The survey was addressed to a specific person in the organization, usually the owner/manager. Participants were asked to deliver the survey to the person in the organization who is responsible for hiring entry-level office workers. A definition (Appendix B) of an entry level office worker was included in the letter of introduction.

The letter also asked that the survey be returned to the researcher by May 15.

On May 23 a follow up letter (Appendix C) together with a second copy of the survey was sent to 45 businesses who had not responded to the initial letter. In essence, the data was collected over a one month period.

Subjects of the Survey

A list of 153 businesses was compiled using Fall 1991 records provided by the Chambers of Commerce from six cities and the "White & Yellow Page" listings for two cities. The Chamber Directors for the two cities that could not provide a list of businesses were helpful in obtaining specific owner's names when needed. The sample size of 153 was chosen based upon statistical calculations that would yield results that could be generalized to the survey population. Hillway (1964) states that the more homogeneous the group the smaller the sample required.

The number of surveys to be sent to each of the eight Wyoming communities was determined by each city's population. The population figures were taken from the 1991 statistics published by the Wyoming Travel Commission. The population calculations produced the following results:

City	Percent of Survey
Buffalo	8%
Cody	12%
Gillette	23%
Newcastle	9%
Powell	12%
Sheridan	18%
Thermopolis	7%
Worland	11%

The five largest employers (as specified by Chamber of Commerce records) in each city were selected. This form of nonprobability sampling was chosen due to the vast number of businesses listed by each Chamber. Using these records the researcher had no way of knowing if an organization was simply a self-employed individual or a business apt to hire entry-level office workers. To make certain the sample was truly informative the researcher chose to use the five largest employers, or a purposeful sampling, (also referred to as a judgment sampling) rather than rely on a pure chance distribution (Ary, Jacobs, & Razavieh, 1985). The remainder of businesses were selected randomly.

Data Analysis

Survey responses were entered into an electronic data base for ease of data retrieval. The responses from the completed surveys were analyzed using descriptive

statistics. The results provided quantitative data for comparison and classification.

The data was analyzed to determine computer usage in business offices in northern Wyoming and to survey the computer training necessary for entry-level office workers. The researcher looked for trends that emerged from this study and attempted to identify relationships.

CHAPTER IV

RESULTS AND DISCUSSION

This study was designed to investigate the level of computer training that should be offered by business instructors for students seeking entry-level office jobs. The study also attempted to ascertain the extent to which the offices in northern Wyoming are computerized. The data in this chapter represent the results of a mail survey.

The sample of 153 businessess was drawn from a population base of approximately 2,400 businesses in northern Wyoming. Mail surveys were completed by 117 businesses which is a 76.5% return rate. Nonparticipants fell into two categories:

1. Three surveys were returned as undeliverable to the designated address.
2. Thirty-three businesses did not respond to the initial survey nor to the follow-up request.

There is no reason to believe that the nonparticipants' responses would be significantly different from the individuals who did respond. It is inferred that the outcome of this study was not adversely affected by the 23 percent who did not respond.

Survey Results

This chapter will indicate the results of the survey as they relate to each question. Questions that had no direct influence on the researcher's final recommendations are not within this chapter but appear in Appendix D.

Preliminary Information

It was necessary to determine the number of office employees in the businesses in northern Wyoming. Therefore, the question was asked "What is the number of office employees?" Only three offices had more than 100 office workers. Of these, one was a banking institution, one an educational institution, and the other a federal government agency. Two respondents had between 51 and 100 workers. Offices with 26 to 50 workers numbered 15, and between 11 and 25 workers numbered 12 responses. There were 26 respondents with between five and ten offices employees. In the largest group, 59 respondents reported less than five office workers in their businesses. A note of interest is that 17 offices reported only one office worker.

Table 1

Number of Office Employees

Office Employees	# of Respondents	Percent of Sample
More than 100	3	3%
51 to 100	2	2%
26 to 50	15	13%
11 to 25	12	10%
5 to 10	26	22%
Less than 5	59	50%

n = 117.

Participants were asked to indicate the major type of business conducted by their organization. The following table identifies the number of businesses who responded and how they categorized themselves.

Table 2

Number Responding by Category

Type of Organization - Number Responding	
Accounting - 4	Health Care - 8
Banking - 3	Insurance - 5
City Government - 5	Legal - 3
Coal Producing - 6	Manufacturing - 5
Communication - 6	Oil Producing - 5
Construction - 4	Real Estate - 6
County Government - 3	Retail - 9
Education - 10	State Government - 3
Engineering - 5	Service - 9
Federal Government - 5	Utility - 4
Financial - 7	Wholesale - 2

n = 117.

Survey Question 1

Business instructors are using typewriters and computers in educational settings. The researcher wished to determine what percentage of office work the respondents

believed their employees performed on the typewriter as well as on the computer. The largest percentage, 79 percent, said they performed at most 30% of their office tasks using typewriters and computers at least 70% of the time. Twelve percent of the respondents believed they used the typewriter at most 70% and the computer at least 30% for office tasks.

The following table describes percentages of typewriter use and computer use for office tasks.

Table 3

Office Tasks, Typewriter vs Computer

Office Tasks	Responses	Percentage
Typewriter 100% Computer 0%	7	6%
Type > 70% Computer < 30%	14	12%
Type < 30% Computer > 70%	92	79%
Typewriter 0% Computer 100%	4	3%

n = 117.

Survey Question 3

One question the researcher was attempting to answer was the amount of computerization in offices in northern Wyoming. Thus, after ascertaining the typewriter usage of business offices in northern Wyoming the researcher asked participants if computers were being used in their place of

business. Only 6% said they did not use computers in their offices with the remaining 94% responding yes.

Table 4

Businesses Using Computers

Using Computers	Responses	Percentage
Yes	110	94%
No	7	6%

n = 117.

Survey Question 4

Participants were asked the total number of computers used for office work in their businesses. As was expected the size of the office usually determined the number of computers. The overall average was 16 computers per office. There were three organizations that had over 100 computers for office use. The largest category of response from the businesses, 48, showed that less than five computers were available for office use. It is interesting to note that of the 110 businesses using computers for office tasks 16, or 15%, said they used only one computer in the office. Four organizations using computers in their businesses did not respond.

Table 5

Number of Computers Used Per Office

Computers in Office	Responses	Percentage
More than 100	3	3%
25 to 100 Computers	13	12%
10 to 24 Computers	18	17%
9 to 5 Computers	24	23%
Less than 5	48	45%

n = 106.

Survey Question 5

Participants were asked what type of computer hardware they used for office work. The majority of respondents (89%) used IBM compatible and/or IBM equipment. The compatible hardware brands were used at a higher percentage (34.5%) over strict IBM hardware users (22%). Only 3% of the respondents used Apple or MacIntosh hardware exclusively. There were a number (8%) of respondents who used a mixed group of hardware (MS/PC DOS based and Apple based) making it difficult to categorize into either of the previous categories.

Table 6

Computer Hardware by Type

Hardware Type	Responses	Percentage
Both IBM and Compatibles	38	34.5%
Compatibles Only	38	34.5%
IBM Only	22	20.0%
Mixed Hardware	9	8.5%
MacIntosh or Apple	3	2.5%

n = 110.

Survey Question 6

Respondents were asked approximately how long they have used their current office computer systems. Most respondents have had their current equipment for less than five years. Many respondents expressed an interest in upgrading and adding on as often as financially allowable. One piece of equipment mentioned as an intended addition was a laser printer. The following table outlines the age of computer equipment in this northern Wyoming survey.

Table 7

Length of Time Equipment in Use

Age of Equipment	Responses	Percentage
10 to 14 Years	7	6%
5 to 9 Years	42	38%
Less than 5 Yrs.	61	55%

n = 110.

Survey Question 9

Respondents were asked if the computers in the office are connected by a local area network (LAN). In this case 36% said they have a network while 64% responded they had no local area network. It is important to note that offices must have more than one computer in order to utilize a network. Ninety of the respondents have more than one office computer.

Participants were also asked if they use electronic mail in their office. Similar results were given. Thirty-eight percent responded they have access to electronic mail while 62% said there was no electronic mail available in their offices.

Table 8

Networks and Electronic Mail

Used in Business	Responses	Percentage
	Computer Network	
Yes	40	36%
No	70	64%
	Electronic Mail	
Yes	42	38%
No	68	62%

n = 110.

Survey Question 10

Does the business utilize a computer modem with telecommunications software was the query of question #10. For 64% of the respondents a modem was utilized while 35% said no they did not use a modem or telecommunications. Two survey participants believed this question was not applicable to their organizations (1%). The researcher attempted to learn the type of communication software used with the modems but many businesses were unsure of software brand.

Table 9

Use of Modem with Office Computer

Telecommunications/Modem	Responses	Percentage
Yes	70	64%
No	38	35%
NA	2	1%

n = 110.

Survey Question 11

Participants responded to the question are "Applicants for entry-level office positions required to take some type of test?" Thirty-seven percent of those responding said yes a test was given. The majority, 63%, gave no test to entry-level office workers.

Table 10

Employer's Use of Job Entry Testing

Employment Test Given	Responses	Percentage
Yes	43	37%
No	74	63%

n = 117.

Survey Question 12

The respondents who gave employment assessments (37%) were asked to identify the type of test. The test types were categorized as: basic skills; typing speed and accuracy; computer knowledge; other. Participants were asked to indicate as many as applied to their company. Some organizations gave a test from each category. However, the largest test by category was for typing speed (86%). Although typing speed was the most commonly tested skill it appeared that organizations who tested typing speed most generally also tested basic skills. Therefore, the results showed that of the organizations who gave some sort of entry test to employees the second most widely used test was for basic skills (72%). The other two categories showed a minimal number of responses.

Survey Question 13

Employers were asked to describe the level of typing skill required of entry-level office employees. The largest response (32%) was that entry-level employees must know how to type. Some respondents, 23%, believed 30 words per minute was necessary. And there were 28% who believed that an entry-level employee should be able to type 50 words per minute. Nine percent stated they required a speed of greater than 50 words per minute.

Table 11

Typing Skill Required

Typing Skill	Responses	Percentage
None Required	8	7%
Must Know How	38	32%
At Least 30 WPM	27	23%
At Least 50 WPM	33	28%
More than 50 WPM	11	9%

n = 117.

Survey Question 14

Participants were asked if they preferred entry-level employees have some type of formal education beyond high school. Sixty percent answered yes they did prefer some type of education/training beyond high school. And 38% said no they did not prefer education/training beyond high school. The remaining 2% did not respond to the question or concluded it was not applicable to their organization.

Table 12

Education/Training Necessary Beyond High School

Education/Training Preference	Responses	Percentage
Yes	70	60%
No	44	38%
No Response	3	2%

n = 117.

Survey Question 15

Respondents were asked to answer this question only if they answered yes to question 14 (60%). If a participant felt that training was necessary beyond high school, what was the preferred training? Respondents could choose as many as applied to their organization, therefore, the total is greater than 100%. Work experience was mentioned overwhelmingly. Cities that have community colleges were more likely to prefer college credit and associate degrees in entry-level employees. Some respondents commented that any or all are helpful to a job candidate.

Table 13

Categories of Education/Training

Categories	Respond With as Many as Apply
Vendor Training - 12%	
Hold Associate Degree - 14%	
Completed a College Certificate Program - 15%	
Technical School Courses - 34%	
Continuing Education Classes - 41%	
College Credit Courses - 55%	
Work Experience - 75%	

n = 117.

Survey Question 16

Would a survey participant be more inclined to hire an entry-level office worker with previous work experience over a person with no work experience? Ninety-two percent answered "yes they preferred work experience" while 6% answered "no" and 2% did not respond.

Table 14

Employer Preference for Previous Work Experience

Previous Work Experience	Responses	Percentage
Yes	107	92%
No	7	6%
No Response	3	2%

n = 117.

Survey Question 17

Respondents were asked if computer experience played a role in their decision to hire an entry-level applicant. Fifty-one percent said computer experience entered in their decision to some extent. Thirty-nine percent believed it played a large degree in their decision. Eight percent of the respondents said computer experience did not enter into hiring decisions and 2% did not respond.

Table 15

Computer Experience Enters in Hiring Decision

Hiring Based on Computer Exp.	Responses	Percent
Not at All	9	8%
To Some Extent	60	51%
Large Degree	45	39%
No Response	3	2%

n = 117.

Survey Question 18

Participants were asked if they found an ample number of applicants (at least 10) in the screening process for entry-level jobs. Fifty-five percent answered yes and 41% answered no. Two percent said they had not hired an entry-level person for several years and therefore could not answer this question. And again 2% did not respond.

Table 16

Adequate Number of Applicants

Ample Number	Responses	Percentage
Yes	64	55%
No	47	41%
Not Hiring	3	2%
No Response	3	2%

n = 117.

Survey Question 19

Respondents were asked: "Of the number of applicants who do apply for entry-level office jobs what percentage are appropriately qualified for the position?" One hundred seven businesses responded to this question. The other seven had not hired for many years and believed they could not answer this question. The majority believed that at least 50% of the applicants were not qualified for the

position advertised. There were comments from the respondents that as many as 80 to 90 percent of the persons who applied were not qualified. Some respondents indicated they also find a very small number of applicants who are over qualified who apply for entry-level office jobs.

Table 17

Applicants Qualified for Entry-Level Position

Applicant's Qualified	Responses	Percent
At Least 50% Who Apply are Not Qualified	55	47%
Applicants Adequately Qualified	52	44%
No Response	10	8%

n = 117.

Survey Question 20

Survey participants were asked to describe their attitude with regard to word processing skills for entry-level employees. Only companies using computers for office tasks (110) were asked to respond. Responses were: an understanding of general word processing concepts, (36%); hands on experience with any brand of word processing software, (37%); trained to use a specific brand of word processing software, (6%); or none of the above, (21%). The researcher acknowledges some abiguity between "a general understanding" and "experience with any brand" which may

have caused some confusion for the respondents. These categories, although clearly different to the researcher, may have been very close in intent for the respondents.

Table 18

Employer Attitude Toward Word Processing

Word Processing Skills	Response	Percentage
General Understanding	39	36%
Experience with Any Brand	41	37%
Trained on Specific Brand	7	6%
None of the Above	23	21%

n = 110.

Questions 21, 23, 25, 27, 29, 31

Respondents were asked to identify a characteristic that best described what they expected in an applicant's ability to use designated software applications. Again only those organizations which utilized computers for office tasks were asked to respond. However, one organization that is in the process of installing a computer system also responded bringing the total number of responses to 111.

The software applications the researcher investigated were word processing, spreadsheet software, data base management, desktop publishing and graphics, computer programming, and computerized accounting software. Respondents were asked to rate their preference as

'required', 'preferred', or 'not required'. Word processing ability was preferred by 61% of the respondents. In all other software applications the 'not required' response outweighed the 'preferred'. It is interesting to note that computerized accounting software, which is a relatively new application, showed nearly the same results as popular applications like spreadsheet software and data base management.

Table 19

Respondent's Opinions on Designated Applications

	Required		Preferred		Not Req.	
Application	Res.	Per.	Res.	Per.	Res.	Per.
Word Processing	19	17%	68	61%	24	22%
Spreadsheet	6	5%	48	43%	57	52%
Data Base Mgmt	2	1%	37	34%	72	65%
DeskTop Publish	1	1%	20	18%	90	81%
Programming	1	1%	13	12%	97	87%
Comp. Accounting	4	3%	35	32%	72	65%

n = 111.

Survey Questions 22, 24, 26, 28, 30, 32

The researcher attempted to identify the specific brand of application software organizations in northern Wyoming would like entry-level workers have some familiarity. Many businesses did not list a preference by brand. With regard

to word processing 30% mentioned WordPerfect as the brand of choice. For spreadsheet applications Lotus was mentioned at 27% preference. A small number of other brands were mentioned but the frequency was insignificant. Again, many businesses did not list a preference.

Summary

1. Computers are being used for office tasks by 94% of the businesses in northern Wyoming. This is a significant increase from a previous survey where 71% of the respondents used microcomputers for office tasks (Rogers, 1990).

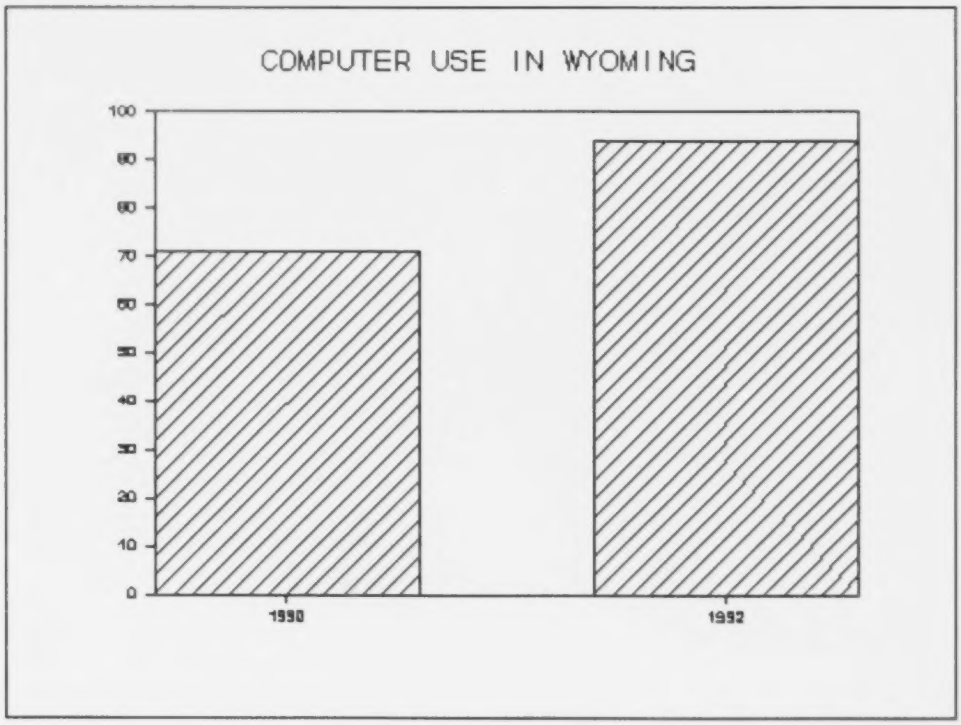

Figure 1. Percentage of computer use. Rogers' 1990 study versus Arzy's 1992 study.

2. Seventy-nine percent of the business organizations in northern Wyoming estimate that less than 30% of their office tasks are performed on a typewriter leaving more than 70% to be done on a computer.
3. The hardware used in northern Wyoming businesses is predominantly IBM or compatible systems. Of the businesses using computers 89% use IBM and/or IBM compatible equipment. Some businesses utilize IBM and/or IMB compatibles and also have the use of a mainframe computer.
4. The ability to operate a word processor is either preferred or required of entry-level office workers by 78% of the businesses in northern Wyoming.
5. Generally, employers conclude there are an ample number of applicants for entry-level office jobs. Although business respondents found a good number of applicants, respondents believed that more than 50% of those applying were not qualified for the positions.
6. Sixty percent of employers of entry-level workers would prefer some level of training beyond high school.
7. Northern Wyoming businesses are more inclined to hire workers with past work experience (92%).
8. Of businesses that have more than one computer, 40% have connected their computers into a local area network.
9. Company size does not significantly affect computer use. Large and small companies have computer equipment

for office work. In small organizations, for example, the one person office, computers may not be used. However, this study indicates that 51% of the businesses have less than 5 office employees and the results show an overall computer usage of 94%.

10. A majority of organizations, 63%, do not give a test of any kind to entry-level applicants. It is not known if they rely on information in the application or references to determine an applicants level of competence.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

In this final decade of the 20th Century we acknowledge that our information workforce now outnumbers our industrial workforce. Research for this study indicated a trend toward employment in information rather than in production jobs. As the need for data management and office occupations grows so too does the need for educators to determine what office skills are most valuable to employers.

Useful material on necessary skills for entry-level workers and the level of office computerization had not been available to business educators who are in a position to train prospective employees. As a result, educators teaching topics on technology that are related to office work should seek information from the business community.

Importance of the Study

The study provided information that previously had not been gathered regarding computer skills for entry-level office workers. The data provided may be used to make decisions in regard to course curriculum in community colleges. A summary of the findings of this survey will be submitted for publication in the state and regional journals subscribed to by business educators.

Conclusions and Recommendations

Information from this study should direct business educators toward the most crucial areas of emphasis when preparing students for entry-level employment. On the basis of this study the following conclusions and recommendations are offered.

In northern Wyoming 94% of the business organizations use computers to perform office tasks. Research for this study and data from an earlier study in Wyoming (Rogers, 1990) show there is reason to anticipated that this number will increase. It is recommended that business educators review courses such as "Computer Information Systems and Microcomputer Application courses" to assure content parallels the technology available in local offices.

Due to the increased computer use in the modern office setting, typewriters are playing a less important role. They are still used for particular office tasks such as forms and envelopes but the largest percentage of paper work is accomplished on a computer. It is recommended that educators stress computer skills while still providing an opportunity for operation of an electronic typewriter.

With the decrease in typewriter usage there has been an increased use of computer equipment. This study indicates IBM and IBM compatible equipment (89%) are the standard for businesses in northern Wyoming. Because equipment among business organizations may look different, educators should

seek to demonstrate similarities and encourage students to be open to the notion that their training on one system can be transferred to other equipment. For example, students should recognize that "all types" of hardware need certain switches, cables, and connectors to operate. With regard to hardware more than half of the respondents in this survey stated that their equipment is less that five years old and exhibited a desire to upgrade as often as possible. As a result, instructors from community colleges that do not have the most modern equipment may need to provide supplemental information in the form of videos and journals.

When companies look for entry-level employees they generally find an adequate number of applicants. However, respondents found that of those who apply, typically only half are actually qualified. Persons seeking entry-level employment should possess skills in the areas of keyboarding, general computer knowledge, and word processing capabilities. The study showed that all persons hoping to obtain entry-level office jobs should know how to type. The literature review supported the view that the ability to type was essential to successful employment. Typing (keyboarding) is viewed as an imperative skill for office workers. Currently, some colleges require typing competency only for students in programs such as office assistant or office clerk. Keyboarding ability should be encouraged throughout the business curriculum for students working

toward any level of business employment. In addition to keyboarding competency employers look at an applicant's ability to use a microcomputer. Companies base hiring decisions on an applicant's ability to use a microcomputer (90%). The degree of ability varies among organizations but essentially all need employees who have had exposure to computer equipment and understand the use of software applications. The literature review for this study indicated that an employee's lack of aptitude in the operation of a computer crippled the department and the business overall. All business students should become acquainted with microcomputers as a method of exposure to available tools used for office tasks.

Additionally, there is a strong preference (78%) for entry-level employees to be knowledgeable in the operation of word processing software. The literature review supports this conclusion. It is highly recommended that all students in business curriculums be familiar and sufficiently knowledgeable with some type of word processing program. With regard to word processing software WordPerfect was the only software package that stood out as far as preference of software brand by the businesses in northern Wyoming. Likewise, Lotus 123 was the only spreadsheet software that was mention with any degree of agreement. Other packages were also mentioned but not with any consistent frequency. It is appropriate to recommend that students train for use

of word processing and spreadsheet softwares but demonstrate flexibility with regard to software brand.

It is further recommended that instructors stress to students the importance of appropriate use of resumes and letters of application. These should be used to represent the individual's job skills. It cannot be determined from the study if the respondents believed more than fifty percent of the applicants were not qualified for entry-level positions because they lacked skills or if applicants were eliminated in the paper screening process due to inadequate applications.

Another characteristic found in the literature review was the preference of employers to hire applicants with previous work experience. In this study, respondents indicated a preference for applicants with education and training beyond high school (60%) and a strong desire for work experience (92%). Based on comments from respondents and the literature review an attempt should be made to provide a course that would allow for student work experience. The credit course should be a part of the sophomore semester curriculum requirement. Students would be placed in offices in the business community. They would work several hours each week during the semester at a designated business. The objective for such a course would be to give students work experience and a potential reference for job applications. Additional benefits to the

college would be partnerships with the local community and could serve as a marketing tool for the business department of the college.

The study showed that currently few businesses (37%) actually require entry-level applicants perform employment tests. Based on research and the competition for jobs educators should prepare students for the possibility that they may be asked to demonstrate basic skills and computer knowledge.

Information from this study suggested that several new courses could be added to the community college curriculum. Respondents expressed an interest in computerized accounting and showed an inclination toward networking office computers. They also pointed out the growth in the use of modems.

Businesses expressed a need for training with computerized accounting software. Training should be made available in colleges that do not currently offer this type of course. Those who currently have the course in place should publicize the course more actively to the business community.

Networking office computers in a local area network is growing in popularity. The use of electronic mail is also showing signs of growth. More training will be needed in this area and the area of communication software. Educators should incorporate LAN training and communication software

information into existing classes or create new courses to meet this need.

This study indicated 64% of the respondents use modems attached to their computers. It may be that the size of the state and the large distances that separate communities may contribute to the high percentage of modem use. It is recommended that course curriculum allow for students to become familiar with modem hardware and software.

The needs of northern Wyoming businesses should be restudied within the next five years because of rapid changes in the computer industry as they relate to business offices.

Recommendations for Further Study

Information from this research has raised several questions. These questions may warrant further study as a means of obtaining current information for those in the educational community who are in a position to change college curriculum.

One question for further study involves information about employment testing. A survey of businesses should be done to determine if the use of employment testing for entry-level workers has grown. If employment testing is not widely used investigate what factor(s) contributes to hiring decisions.

A second item for further study entails applicant qualifications. Businesses should be surveyed to ascertain

what number of applicants are qualified for entry-level positions. If a large number respond negatively then an inquiry should be made as to what is lacking in the applicants' qualifications.

Another question raised that warrants further study is the potential growth in the use of communication software. A study should investigate what communication software is used and if adequate training is available for those who will be required to use this technology.

Lastly, it is noted that responses to this survey may have been based on the growing needs of businesses due of the rapid growth of computer technology. Future methods of providing training should be researched and newer technologies should be included in a study of skills for entry-level employees.

Concluding Remarks

The purpose of this study was to examine the level of computer training that should be offered by business educators in northern Wyoming to students hoping to obtain entry-level office jobs. The survey results show that computers are used by 94% of the businesses. In the Rogers study of 1990 the findings indicated a 71% computer usage for business offices. This 23% growth should be a serious consideration for educators in a position to affect course content at community colleges.

Intense efforts should be made to offer courses using

current textbooks and the most modern technology whenever possible. Typewriters should not be abandoned but should be used as ancillary equipment to the computer. More coursework should be directed toward networks and communication software training. In addition, community colleges should attempt to offer some type of student work program that could serve as work experience for students. Because employers expect a level of computer competency from job applicants, instructors must stress to students that computer skills appear to be the most easily transferred skills, having greater apparent utility in the business world than somewhat less tangible qualifications such as, "ability to work with people" (Spitler, 1992). This certainly seems adequate justification for computer training as a mandatory skill in every business curriculum.

Due to the diversity of software and hardware on the market and in offices in northern Wyoming, students should be prepared to market their computer knowledge on job applications and during job interviews. A student's training on a particular hardware or software type should not exclude him/her from employment in an entry-level office job where a different system is used. Courses should be available that encourage students to adapt their particular training to the office setting in which they hope to be employed.

APPENDIX A

SURVEY INSTRUMENT

Analysis of Necessary
Computer Skills for
Entry-Level Workers
in
Northern Wyoming

BUSINESS AND COMPUTER SKILLS SURVEY
NORTHERN WYOMING

Total Number of Employees_____

Number of Office Employees_____

Position/Title of Person Completing Form_____

Please place an X next to the option that best identifies your organization.
Indicate the major type of business conducted.

_____accounting
_____banking
_____education
_____legal
_____service
_____financial
_____other
please describe_____

_____city government
_____county government
_____federal government
_____state government
_____oil producing
_____utility
_____coal producing

****

SECTION I EQUIPMENT

1. What amount of work in your office is done on a typewriter as compared to work on a computer. Please approximate
   Typewriter 100%_____
   T 70% C 30%_____
   T 60% C 40%_____
   T 50% C 50%_____
   T 40% C 60%_____
   T 30% C 70%_____
   Other_____

2. Are the majority of your typewriters (circle one)
   ELECTRONIC with Memory Conventional Typewriter

3. Are computers being used at your place of business? YES NO
   (If NO, please go to Section II, question #11)

4. What is the total number of computers used for office work in your business?
   Total Number of Computers_____

5. What type of computer hardware do you use (circle as many as applicable)
   IBM APPLE MacIntosh IBM compatible
   Main Frame Other_____

6. Approximately how long have you used your current office computer system? (Approximately what age is your equipment?)
   _____

7. Did you have other equipment prior to what you are currently using? Type of equipment_____ YES NO

8. Do you plan to add-on to OR replace your current system in the near futu (next 2 years) YES NO
   Type of equipment? _____

9. Are the computers in your office connected by a Local Area Network (LAN) Computers Networked YES NO

BEST COPY AVAILABLE

Do you use electronic mail?

YES NO

10. Does your business utilize a computer modem with telecommunications software? YES NO

Type used (place X next to appropriate service):
CompuServe_____
Prodigy_____
Lexis_____
Organization Specific_____ (name)
Other_____

****

SECTION II ENTRY LEVEL EMPLOYEE SKILLS

The following questions refer to skills required by your organization when hiring entry level office employees. An entry level office employee is defined as one responsible for handling correspondence, filing, data entry, etc. Please circle the appropriate answer.

11. Are applicants for entry level office positions required to take some type of test?

Test Given	YES	NO

12. Is this a test of: (circle all that apply)

Basic Skills	YES	NO
Typing Speed & Accuracy	YES	NO
Computer Knowledge	YES	NO
OTHER_____	YES	NO

13. Which of the following best describes the level of typing skill required of entry level office employees in your organization:
No typing skills required_____
Applicant must know HOW to type_____
Typing speed of at least 30 w.p.m._____
Typing speed at least 50 w.p.m._____
Greater than 50 w.p.m. required_____
Other_____

14. Do you prefer entry level employees have some type of formal education beyond high school?

YES NO

15. If you answered YES to question #14 what type of education/training do you desire?

Formal college credit courses	YES	NO
Complete a college certificate program	YES	NO
Hold a College Associate Degree	YES	NO
Trained through a vendor	YES	NO
Past work experience	YES	NO
Technical school classes	YES	NO
Continuing Educ. non-credit classes	YES	NO

16. Would you be more inclined to hire an entry level office worker with previous office work experience (whether it be paid employment, volunteer work or an education related practicum) over a person with no work experience?

YES NO

17. Does computer experience enter into your decision to hire an entry-level office employee?
Not at all_____ To some extent_____ Large Degree_____

18. When screening and interviewing prospective entry level employees do you find an ample number of applicants for the job. (Ten or more applicants)
YES NO

19. Of the applicants who apply for a position with your organization what percentage do you feel are qualified for the job. (For example, 4 of 10 or 40%)

% Not Qualified_____ % Qualified_____ % Over Qualified_____

****

*** The following questions refer to computer skills that may or may not be necessary to successfully gain employment with your organization. If computers are not used by your organization please go to SECTION III.

20. Which of the following statements best describes your attitude with regard to word processing skills for entry level office employees? Please mark with an X

Applicants must have:
____ An understanding of general word processing concepts.
____ Hands-on experience with any brand of word processing software.
____ Trained to use a specific brand of word processing software.
____ None of the above

Please circle one of the following codes for each characteristic in relation to entry level office applicants.
1--Required, 2--Preferred, 3--Not Required

		Required	Preferred	Not Required
21.	Training in the use of word processing software	1	2	3
22.	Specifically trained in:			
	NO Preference	1	2	3
	Word Perfect 5.0/5.1	1	2	3
	MicroSoft Word	1	2	3
	WordStar	1	2	3
	DisplayWriter	1	2	3
	Other_____	1	2	3
23.	Training in the use of spreadsheet software	1	2	3
24.	Specifically trained in:			
	Lotus 123	1	2	3
	Excel	1	2	3
	QuatroPro	1	2	3
	VisiCalc	1	2	3
	Other_____	1	2	3
25.	Training in the use of electronic data base	1	2	3
26.	Exposure specific in:			
	DBase III+ (or IV)	1	2	3
	Other_____	1	2	3

		Required 1	Preferred 2	Not Required 3
27.	Training in desk top publishing or graphics			
28.	Exposure specific in:			
	Page Maker	1	2	3
	Ventura Publishing	1	2	3
	Other_____	1	2	3
29.	Training in computer programming	1	2	3
30.	Specifically trained in:			
	BASIC	1	2	3
	RPG	1	2	3
	Assembler	1	2	3
	FORTRAN	1	2	3
	Other_____	1	2	3
31.	Training in Accounting computerized software	1	2	3
32.	Specifically trained in:			
	Peachtree	1	2	3
	DAC Easy	1	2	3
	Other_____	1	2	3

****

SECTION III SURVEY ANALYSIS

Thank you for participating in this survey. Your time is greatly appreciated. Please be assured that this data will be used for statistical analysis only. Your organization will not be specifically identified in any of the results.

Any other comments about the preparation of entry level employees for employment in Northern Wyoming or your impressions of computer systems will be greatly appreciated.

COMMENTS:

If you would like to receive a copy of the survey results please enter your name and address below. Please allow 4 to 6 weeks for analysis of this survey. Thank you again for your time.

_____

_____

_____

APPENDIX B

LETTER OF INTRODUCTION

DEFINITION AND SUGGESTIONS

Sheridan College

3059 Coffeen Avenue
P.O. Box 1500
Sheridan, Wyoming 82801
(307) 674-6446

April 30, 1992

^F1^

Dear ^F2^

What do business people have so little of. . .TIME. As part of a research project I am asking that you donate some of yours to answer the enclosed survey. It is a survey of northern Wyoming (Powell, Cody, Newcastle, Gillette, Buffalo, Sheridan, Worland and Thermopolis) analyzing skills that employers look for when hiring entry level office workers. A definition of entry level employee is on the back of this letter. The research will be used in planning future courses. The purpose is to ascertain to what extent the offices in northern Wyoming are computerized and to determine what skills are most necessary for entry level employees.

The survey is two pages in length with questions on both the front and back sides. It should take approximately 15 minutes to complete. Please pass this survey on to the person who is responsible for hiring and supervising entry level employees. I have listed some brief instructions on the back of this letter.

The information you provide will be kept confidential. A hand written identification number appears in the lower right hand corner. Nationally, the rate of return on surveys is very low. The identification number will be used to send reminders to survey participants in the hope of achieving a high rate of response. When the questionnaire is returned the answers will be tabulated and the identification codes will be destroyed.

I recognize that business people have very little free time. I hope you will take a moment to complete this survey because I value your opinion. Thank you for making this project a success. Please feel free to call me at 674-6446 ext. 253. If at all possible please **return the survey by May 15th**.

Sincerely

Marsha Arzy
Instructor of Business

Providing quality, comprehensive, lifelong learning opportunities to Northern Wyoming

Sheridan College is operated by the Northern Wyoming Community College District, an equal opportunity employer

SUGGESTIONS/HELPFUL HINTS

Definition: Entry Level Office Worker

For the purpose of this survey an entry level office worker will be defined as:

"A person who's job responsibilities include ANY of the following: correspondence, filing, data entry, telephone duties, receptionist responsibilities, travel or event planning, bookkeeping, recordkeeping."

Number of Employees:

If you employ part time workers you may want to state so, OR you are welcome to estimate what the full time equivalent would be.

Not Sure a Question Applies to Your Company:

If you encounter a question you feel does not apply please state that on the question and continue the survey. Research shows people stop when they feel they can't answer particular questions. Be assured I am interested in your completing the survey even though you may need to skip some questions.

Unclear on Hardware:

It can be difficult to determine exactly what type of computer system you have. Some offices have technical support available by phone in other cities or states. These people may be helpful. If you cannot ascertain the type of hardware, etc. please answer as best you can and continue with the survey.

Thank You. If I can be of assistance to YOU (now or in the future) please feel free to call on me.

APPENDIX C

FOLLOW-UP LETTER

Sheridan College

3059 Coffeen Avenue
P.O. Box 1500
Sheridan, Wyoming 82801
(307) 674-6446

May 23, 1992

1~

Dear 2~

I am writing to follow up my letter of April 30th. In that letter I asked for your time to complete a survey about job skills you require of entry-level office workers. You will recall that I defined an entry-level worker as: **"A person who's job responsibilities include ANY of the following: correspondence, filing, data entry, telephone duties, receptionist responsibilities, travel or event planning, bookkeeping, recordkeeping."**

The surveys that have been completed and returned to me have provided interesting and useful information about computerization of the businesses in Northern Wyoming and the skills expected of entry-level employees. To date there is a 62% return rate on the survey. This is very good according to rate of return statistics involving mail surveys.

Help me achieve my goal of an 85% return rate by filling out and returning this survey today. I appreciate your time more than you will ever know.

If your return survey has crossed in the mail please know I am grateful for your assistance and feel free to discard the enclosed material.

Most Sincerely

Marsha Arzy
Instructor of Business

Providing quality, comprehensive, lifelong learning opportunities to Northern Wyoming
Sheridan College is operated by the Northern Wyoming Community College District, an equal opportunity employer

APPENDIX D

SURVEY QUESTIONS

NOT ADDRESSED IN CHAPTER IV

APPENDIX D

Research Questions Not Addressed in Chapter IV

This appendix reports the participant responses on four questions that are not found in Chapter IV. After analyzing the data it was determined that these four responses did not directly affect the final recommendations made by the researcher.

Preliminary Information

The researcher was interested in learning if a relationship existed between company size and the use of microcomputers in office tasks. Therefore, the question was asked "What is your total number of employees?" Only 26 respondents stated they have more than 100 employees. Fourteen respondents had more than 50 employees but less than 75. Thirty companies had between 11 and 50 employees while 45 respondents stated they employed 10 or fewer people. The "average" number of total employees was 66. Table 18 indicates the total number of employees of the survey respondents. Two businesses of the 117 did not answer this question.

Table 20

Total Number of All Employees

Total Employees	# of Respondents	Percent of Sample
Greater than 100	26	23%
76 to 100	1	1%
51 to 75	13	11%
26 to 50	14	12%
11 to 25	16	14%
10 or Fewer	45	39%

n = 115.

Survey Question 2

Of the businesses using typewriters it was asked if the majority of the typewriters were the conventional typewriter or if these were electronic with memory. The responses indicate nearly a 50/50 split with regard to the type of typewriter. Conventional typewriters were used by 49% of the respondents while 51% said they utilized electronic typewriters with memory capabilities.

Table 21

Classification of Typewriters

Type of Typewriter	Repsonses	Percentage
Conventional Type	55	49%
Electronic w/Memory	58	51%

n = 113.

Survey Question 7

Question 7 stated "Did you have other equipment prior to what you are currently using?" There was a 62% response of yes and 37% response of no. The researcher believes there may be some confusion as to whether the respondents are referring to prior 'computer' equipment or other office equipment like typewriters etc. The researcher was looking for information about a company's willingness to replace and upgrade computer equipment. This question did not satisfy that objective.

Table 22

Other Equipment Prior to Current System

Prior Equipment	Responses	Percentage
Yes		62%
No		38%

n =

Survey Question 8

Participants were asked if they planned to add on to or to replace their current system in the next two years. There was a close outcome with affirmative responses at 47% compared to 52% responding no. Most who responded yes plan to upgrade their computers. Another common add-on was the purchase of a laser printer.

Table 23

Planning to Add Over Next Two Years

Replace or Add-On Equipment	Response	Percentage
Yes	52	47%
No	58	52%

n = 110.

REFERENCES

Ary, D., Jacobs, L., & Razavieh, A. (1985). Introduction to research in education (3rd ed.). Fort Worth, Texas: Holt, Rinehart, and Winston, Inc.

Baldry, C. (1988). Computers, jobs and skills: The industrial relations of technological change. New York: Plenum Press.

Barr, L. & Zancanella, J. (1986). Final report on basic entry-level competencies needed for employment in the state of Wyoming. Laramie, Wyoming: University of Wyoming, Coe Library (Hebard HF1121).

Bartholome, L. (1991). Preparing business education for the 21st century. Business Education Forum, 46(2), 15-18.

Bovee, C. & Thill, J. (1989). Business communication today. New York: Random House.

Burton, D., Jr., Filer, J., Fraser, D., & Marshall, R. (Eds.). (1986). The jobs challenge: Pressures and possibilities. Cambridge: Ballinger.

Daniel, C. (1988, April). Tomorrow's computer skills--today. Personnel, pp. 28-34.

Endrijonas, J. (1992, February). Magnetic media changed our world in 11 years. The Office, pp. 20-21.

Erickson, R. & Asselin, Y. (1986). Clerical competencies for the automated office of the future. Journal of education for business. 61(7), 325-327.

Gattiker, U. (1989). Computer technology and end-user training: An integration of information processing and man-machine interface perspectives. Ottawa, Canada: Social Sciences and Humanities Research Council. (ERIC Document Reproduction Service No. ED 326 183).

Garrett, A. & Lundgren, T. (1992). The need for programming skills. Business Education Forum, 46(4), 11-13.

Goldstein, H. & Fraser, B. (1985). Training for work in the computer age: How workers who use computers get their training. Washington, DC: National Commission for Employment Policy. (Research Report No. RR-85-09).

Haynes, T. (1992). Defining the workforce for the 1990s: Implications for curriculum development and instructional practice. NBEA Yearbook, 30, 7-19.

Hillway, T. (1964). Introduction to Research. Boston, Massachusetts: Houghton Mifflin.

Lankard, B. (1990). Employability--the fifth basic skill. (Report No. EDO-CE-90-104). Washington, DC: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 325 659).

McMeen, G. (1986). The impact of technological change on education. Educational Technology, 26(1), 42-45.

Naisbitt, J. (1982). Megatrends. New York: Warner Books, Inc.

Natriello, G. (1989). What do employers want in entry-level workers? An assessment of the evidence. Washington, DC.

(ERIC Document Reproduction Service No. ED 308 279).

Nellermore, D. (1992). Preparing students for employment--or, what managers really want. Business Education Forum, 46(3), 11-13.

Orlich, D. (1978). Survey Design. Pleasantville, NY: Redgrave Publishing Co.

Owens, T., Lindner, F., & Cohen, C. (1988). Entry-level worker study: Phase 1 report. Washington, DC: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 313 500).

Pilch, C. (1989). Knowledge and skills currently needed by entry-level secretarial/clerical employees in Laramie, Wyoming. Master's thesis. University of Wyoming, Laramie, WY.

Povick, L. (Ed.). (1990, April). Computer Facts. Working Woman, pp. 63 - 68.

Rhodes, J. (1992, April). [Personal interview with J. C. Rhodes, Jr., statistician for State of Wyoming: Dept. of Employment]. Casper, Wyoming.

Rogers, C. (1990). Survey and analysis of microcomputer applications in business: Laramie county, Wyoming. Master's thesis. University of Wyoming, Laramie, WY.

Short, J. (1991, May 6). Entry-level jobs remain out there. New York Times, p. 14N.

Spitler, H. (1992). Marketing research: From the classroom to the real world. Business Education Forum, 46(4), 23-25.

Stevens, C., & Ferre, V. (1992). Computer applications in business: A guide for high school training. T.H.E. JOURNAL, 19(8), 63-65.

Toppe, J. (1991). Keyboarding--An enabling skill. Business Education Forum, 46(2), 22-23.

Trainor, T. & Krasnewich, D. (1987). Computers. New York: Mitchell Publishing.

U. S. Department of Labor: Secretary's Commission on Achieving Necessary Skills (SCANS). (1991, June). Blueprint for action: Building community coalitions. Washington, DC: Government Printing Office.

U. S. Department of Labor: Secretary's Commission on Achieving Necessary Skills (SCANS). (1991, June). What work requires of schools: The scans report for America 2000. Washington, DC: Government Printing Office.

Washing, H. & Boveington, K. (1986, May). Keeping account of employees' skills. Supervisory Management, pp. 20-24.

Wentling, R. (1992). Business professionals and keyboarding skills. Business Education Forum, 46(3), 30-32.

Werneke, D. (1983). Microelectronics and office jobs: The impact of the chip on women's employment. Geneva: International Labour Office.

Wiggs, L. (1992). Providing skills for an information society. Business Education Forum, 46(4) 19-21.

Wright, L. (1988). Business software usage in Natrona County, Wyoming. Master's thesis. University of Wyoming, Laramie, WY.

Wyoming Department of Employment. (1991, August). 1989-1990 Annual covered employment for the State of Wyoming. Casper, WY: Division of Research and Planning.

Wyoming Department of Employment. (1991, March). Industry and occupational projections for the State of Wyoming: 1990 through 1996 (Vol 1). Casper, WY: Division of Research and Planning.

Zahn, D. & Poole, V. (1992). Education and work partnerships. NBEA Yearbook, 30, 183-195.